



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : BCAC302 Data Structure through C

UPID : 3000071

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :

[1 x 10 = 10]

- (I) Which of the following problems can't be solved using recursion?
 - a) Factorial of a number
 - b) Nth fibonacci number
 - c) Length of a string
 - d) Problems without base case
- (II) What is an AVL tree?
 - a) a tree which is balanced and is a height balanced tree
 - b) a tree which is unbalanced and is a height balanced tree
 - c) a tree with three children
 - d) a tree with at most 3 children
- (III) Which of the following method is used for sorting in merge sort?
 - a) partitioning
 - b) merging
 - c) exchanging
 - d) selection
- (IV) What is a hash function?
- (V) Structure pointer in C is declared using the keyword -----
- (VI) Why we need to a binary tree which is height balanced?
 - a) to avoid formation of skew trees
 - b) to save memory
 - c) to attain faster memory access
 - d) to simplify storing
- (VII) What is the time complexity for inserting a node at the beginning of a singly linked list?
- (VIII) In recursion, the condition for which the function will stop calling itself is _____
 - a) Best case
 - b) Worst case
 - c) Base case
 - d) There is no such condition
- (IX) What is the average case time complexity for finding the height of the binary tree?
 - a) $h = O(\log \log n)$
 - b) $h = O(n \log n)$
 - c) $h = O(n)$
 - d) $h = O(\log n)$
- (X) What is the average case time complexity of merge sort?
 - a) $O(n \log n)$
 - b) $O(n^2)$
 - c) $O(n^2 \log n)$
 - d) $O(n \log n^2)$
- (XI) Which of the following is not a technique to avoid a collision?
 - a) Make the hash function appear random
 - b) Use the chaining method
 - c) Use uniform hashing
 - d) Increasing hash table size
- (XII) What kind of structure has been defined below?

```

struct Employee
{
int employee_id;
char name[20];
int salary;
};

struct Organisation
{
char organisation_name[20];
char org_number[20];

struct Employee emp;
};

```

Group-B (Short Answer Type Question)

Answer any three of the following :

[5 x 3 = 15]

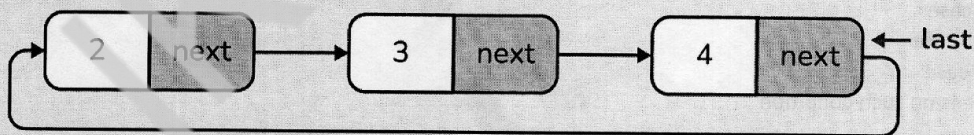
2. Write a C code snippet to define a union for holding an integer, a float, and a string. [5]
3. What are the different types of Binary tree? In how many ways we can traverse a binary tree. [5]
4. Write a C function to insert a node at the end of a singly linked list. The function will accept a list and the value to be inserted in the new node. [5]
5. State the key differences between Stack and Array. Describe some of the usage of Stack . [5]
6. Write a code to create an alias using typedef for a structure that represents a point in 2D space. [5]

Group-C (Long Answer Type Question)

Answer any three of the following :

[15 x 3 = 45]

7. (a) Write a C program to define a structure Employee with fields id, name, and salary. [5]
 (b) write functions to take input. [5]
 (c) write functions to display the employee data. [5]
8. (a) What is STACK? [5]
 (b) Briefly explain the pop and peek operation. [5]
 (c) What are the exceptional condition that may arise while pushing or popping some data in STACK? [5]
9. (a) What is a Circular Linked List? What are the different types of Circular Linked List? [5]
 (b) Write a C function to Create/Declare a Node of Circular Linked List. [5]
 (c) Write a C function to create a circular linked list with three nodes (2, 3, 4) [5]



10. (a) What is Tower-Of-Hanoi? What are the rules to be followed in this problem? [5]
 (b) Write a recursive algorithm for Tower of Hanoi. [5]
 (c) Implement the recursive approach using C. [5]
11. (a) What is a threaded binary tree, and why is it used? [5]
 (b) Describe the difference between a single-threaded and double-threaded binary tree. [5]
 (c) How does a threaded binary tree improve the efficiency of in-order traversal? [5]

*** END OF PAPER ***